ACCESSION #: 9607300328

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Washington Nuclear Plant - Unit 2 PAGE: 1 OF 3

DOCKET NUMBER: 05000397

TITLE: MANUAL REACTOR SCRAM DUE TO DIGITAL FEEDWATER SYSTEM

ERROR FOUND DURING TESTING

EVENT DATE: 06/24/96 LER #: 96-004-00 REPORT DATE: 07-24-96

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 029

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Bill Pfitzer, Licensing Engineer TELEPHONE: (509) 377-2419

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On June 24, 1996 at 1003, with the plant operating at 29 percent power in Mode 1, the plant was manually scrammed by control room personnel due to a reactor water level transient experienced during testing of the Digital Feedwater (DFW) system. After performing a step of the test procedure which reduced reactor level by 6 inches, reactor level continued to decrease past the intended 6 inches. Control room personnel took manual control of the reactor feedwater system but were unable to recover level control prior to receiving a Reactor Protection System (RPS) 'B' low level half scram. When the half scram was received the reactor was manually scrammed per direction of the control room supervisor.

Event notification was made to the NRC pursuant to the requirements of 10 CFR 50.72(b)(2) as an Engineered Safety Feature (ESF) actuation.

The cause of the event was determined to be a manufacturer's programming error in the DFW system testing software which was later corrected.

The safety significance of this event is minimal.

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Event Description

On June 24, 1996, with the plant operating at 29 percent power, the newly installed DFW [JB] system was being functionally tested during power ascension per a plant test procedure. The test procedure instructed control room personnel to initiate positive and negative 3 inch and 6 inch step changes in reactor water level setpoint, and observe the DFW system response to those changes. After performing a step of the test procedure which initiated a 6 inch step decrease in reactor level setpoint, reactor level continued to decrease past the intended 6 inches. Reactor water level was approximately 41 inches prior to initiation of the 6 inch reduction. When reactor water level dropped to approximately 28 inches control room personnel took manual control of the reactor feedwater system, attempted to stabilize level, but were unable to recover level prior to receiving an RPS [JC] 'B' low level half scram at approximately 13 inches reactor level. The reactor [RCT] was manually scrammed per direction of the control room supervisor after the half scram was received.

Immediate Corrective Action

Control room personnel completed post scram activities and placed the plant in a shutdown condition. A Problem Evaluation Request was initiated, and event notification was made to the NRC pursuant to the requirements of 10 CFR 50.72(b)(2) as an Engineered Safety Feature (ESF) actuation.

Further Evaluation

Investigation determined the test program for the DFW programmable logic controller (FANUC) [PMC] had initially introduced a 6 inch step decrease in the master level controller setpoint as expected. However, approximately two seconds later the software program unexpectedly introduced another 6 inch step decrease, and approximately 0.7 seconds later another unexpected 6 inch step decrease was introduced. With the exception of the introduction of these two unexpected step changes, the feedwater control system responded as expected to the step changes and the subsequent manual action by control room personnel.

A similar problem was observed during simulator testing of the test program in May 1996 when multiple step inputs occurred following initiation of a single step change. It was determined that the multiple step changes were introduced due to "bounce" in the F12 keyboard [KBD] key used to initiate the step change. General Electric (GE) changed the software to add a timer to the logic which prevented initiation of step changes from the F12 key for a period of two seconds after the first step

change is received. The software change was verified and validated by GE.

Investigation of the test portion of the DFW software after the scram event revealed that toggling the feed/steam flow mismatch software logic while the two-second timer is running initiates a subsequent step change and restarts the timer. Additionally, it was revealed that random plant-generated electronic noise, when combined with the normal flow mismatch existing during a

level transient, caused total mismatches to occur in the feed/steam signal large enough for the software switch to toggle (at >/=5.0%), resulting in the unwanted step changes.

Validation and verification of the two-second timer software change by GE assumed the feed/steam flow mismatch always remained within tolerance and did not toggle. As a result of this new information it was determined that although the two-second timer software change solved the bounce problem with the F12 key, it introduced a new problem which went undetected until causing this event. GE modified the software to remove the two-second timer and insert a register which returns to zero immediately after a step change is initiated. This modification was modeled after the GE Adjustable Speed Drive (ASD) test software program and causes any subsequent step changes inadvertently generated by the program software to be "zero steps" which will cause no change. This

software change was verified and validated by GE and Supply System personnel and functionally tested on the plant simulator on June 25, 1996.

Root Cause

The root cause of this problem is a functional design deficiency related to a manufacturer's software/programming error.

Further Corrective Action

The DFW software has been modified by GE to ensure undesired step changes can not be introduced.

The DFW turbine/level control system response has been reviewed. Lessons learned from this event have been incorporated into pre-job briefings for the power ascension testing.

Assessment of Safety Consequences

The safety consequences of this event are minimal. The test block of the DFW system programmable logic controller is only used during testing of the system and is not in use during normal plant operations. Power ascension testing of the DFW system was well planned to functionally test the DFW system by insertion of small step changes in reactor level. Good control room command and control and attentiveness to the testing was demonstrated by the timely attempt to gain manual control of reactor level and the subsequent manual scramming of the reactor just prior to receiving a full reactor scram due to low reactor level. Plant systems operated as expected and safety systems were available.

Previous Similar Events

No previous similar events involving software problems during operational

testing of new systems have occurred.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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July 24, 1996

GO2-96-144

Docket No. 50-397

Document Control Desk

U. S. Nuclear Regulatory Commission

Washington, D.C. 20555

Gentlemen:

Subject: NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21,

LICENSEE EVENT REPORT NO. 96-004-00

Transmitted herewith is Licensee Event Report No. 96-004-00 for WNP-2.

This report is submitted in response to the reporting requirements of

10CFR73 and discusses the items of reportability, corrective action

taken, and action taken to preclude recurrence.

Should you have any questions or desire additional information regarding

this matter, please call me or Ms. Lourdes Fernandez at (509) 377-4147.

Respectfully,

P. R. Bemis (Mail Drop PE23)

Vice President, Nuclear Operations

Enclosure

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